

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE GENERAL SPECIFICATIONS**

**UNDERGROUND OUTLET**

(No.)

**CODE 620**

**SCOPE**

The work shall consist of furnishing and installing a conduit, fittings, and appurtenances beneath the ground surface as specified, in order to convey surface water to a suitable outlet.

**PUBLIC AND PRIVATE UTILITIES**

Utilities are defined to be public or private, overhead and underground power or communication lines, and any pipelines. The landowner/operator/contractor shall conduct their own search and discovery for utilities in order to lessen or avoid potential damages, injuries or loss of life. Prior to construction, the landowner/operator should complete an OK-ENG-45 UTILITIES INVENTORY FORM to document known utilities in order to comply with State law prior to any ground disturbance and return it to a USDA-NRCS representative.

**QUALITY CONTROL**

Quality Control of all materials and construction procedures is the responsibility of the landowner/operator and contractor. NRCS will make periodic review(s) of the work for the benefit of the agency which will include the final construction check.

**MATERIALS**

Unless otherwise designated, all underground outlet materials shall be new and be made of plastic, concrete, metal, or clay. Conduit materials shall meet or exceed the minimum requirements of the appropriate recognized specification adopted by the American Society for Testing and Materials (ASTM), American Association of State Highway Transportation Officials (AASHTO), or the American Water Works Association (AWWA). These types of organizations are continually updating specifications, so the table below lists current specifications that underground outlet materials (including fittings) shall meet or exceed.

TYPE		SPECIFICATION	
Concrete		ASTM C14, C76, C118, C361, C412, C444, C478, C497, C505, C506, C507, C654, C655, C985, C1433	AASHTO M86, M170, M176, M178, M175, M206, M207, M242, M259, M273,
Plastic	High Density Polyethylene (HDPE)	ASTM D2239, D2737, D3035, F405, F667, F810, F892, F894	AASHTO M252, M294, MP7-95
Plastic	Polyvinyl Chloride (PVC)	ASTM D1785, D2241, D2672, D2680, D2729, D3034, F679, F758, F789, F794, F949	AASHTO M264, M304
Plastic	Acrylonitrile-Butadiene-Styrene (ABS)	ASTM D2852, D2680	AASHTO M264

Conservation practice general specifications are reviewed periodically and updated if needed. To obtain the current version of this specification, contact the Natural Resources Conservation Service.

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Metal	Steel	ASTM A53, A134, A135, A139, A760, A762, A858, A865	AASHTO M36, M190, M245 AWWA C200
Metal	Aluminum	ASTM B744, B745, B744, B790	AASHTO M196
Clay		ASTM C4, C301, C700	AASHTO M65, M179

Onsite NRCS approval of materials will be required and be based on properly marked material showing compliance with the applicable specification.

All joints and connections shall be made so as to withstand the design pressure for the conduit without leakage and shall leave the inside of the conduit free of any obstructions that may tend to reduce its capacity below design requirements.

All fittings, such as couplings, reducers, bends, tees and crosses, shall be installed in accordance with the recommendations of the conduit manufacturer's installation specifications.

All valves and appurtenances shall be of adequate capacity and suitable quality to withstand the design pressures and shall be installed in accordance with the manufacturer's recommendations.

#### **REMOVAL OF WATER**

It will be the contractor's responsibility to perform work required for the removal of surface or groundwater as needed to perform the required construction in accordance with the specifications and drawings. The contractor will be responsible for the repair of any damage incurred by the failure of the contractor's dewatering system.

#### **TRENCH CONSTRUCTION**

The bottom of the trench excavation shall be concave shaped in the center for proper conduit bedding. The maximum trench width shall be the conduit diameter plus twenty-four (24) inches. The minimum trench width shall be the conduit diameter plus six (6) inches, except when the trench is shaped to fit the conduit, additional width is not required.

The trench bottom shall be uniform so that the conduit will lie on the bottom without bridging. Clods, rocks and uneven spots which could damage or cause non-uniform support to the conduit shall be removed.

Where rocks, boulders, or any other material which might damage the conduit are encountered, the trench bottom shall be undercut a minimum of four (4) inches below final grade and filled with bedding material consisting of sands or compacted fine-grained soils.

Unless otherwise specified, the depth of cover over all types of conduits shall be a minimum of twenty-four (24) inches and a maximum of forty-eight (48) inches.

Provisions shall be made to insure safe working conditions where unstable soil, trench depth, or other conditions are such as to impose safety hazard to personnel working in the trench.

#### **PLACEMENT**

Conduits and appurtenances shall be installed to the line and grade shown in the plans or as staked in the field and according to the recommendations of the manufacturers. Abrupt changes in grade must be avoided to prevent rupture of the conduit.

Care shall be taken to prevent permanent distortion and conduit damage when handling during unusually warm or cold weather. The conduit shall be uniformly and continuously supported over its entire length on firm stable material. Blocking or mounding shall not be used to bring the conduit to final grade. For conduits with belled ends, bell holes shall be excavated in the bedding material as needed to allow for unobstructed assembly of the joint and to permit the body of the conduit to be in contact with the bedding material throughout its length.

Plastic conduit shall be placed in the trench and allowed to come to within a few degrees of the surrounding soil temperature prior to any backfilling, except for backfill placed in the trench for the purpose of shading, and prior to connecting to other facilities. This may be done by filling the conduit with water or by leaving the trench open overnight before backfilling.

Plastic conduits may be placed by plow-in equipment if soils are suitable and rocks will not damage the conduit. During plow-in installations, special care needs to be exercised relative to grade control.

The ends of the conduits shall be protected during installation. All appurtenant structures, including trash and animal guards, shall be installed promptly, and provisions shall be made for protecting them during installation.

### **INITIAL BACKFILL**

Initial backfill is backfill placed from the bottom of the trench to one (1) foot above the installed conduits. Unless otherwise specified, hand compaction, mechanical compaction, or water packing methods are acceptable methods for compacting backfill material.

The initial backfill material shall be selected soil or sand free from rocks or stones larger than one (1) inch in diameter and earth clods greater than approximately two (2) inches in diameter. At the time of placement, the moisture content of the material shall be such that the required degree of compaction can be obtained with the backfill method to be used. This initial backfill should be compacted around the conduit to a density at least equal to the natural density of the trench sidewalls. Deformation, displacement, or damage of the conduit must not occur during backfilling.

If either a hand compaction or mechanically compaction method is used, the initial backfill shall be compacted firmly around and above the conduit as required to provide adequate lateral support to the conduit.

If water packing is used, the conduit shall first be filled with water. The initial backfill, before wetting, shall be of sufficient depth to insure complete coverage of the conduit after consolidation has taken place. Next, water packing is accomplished by adding water to diked reaches of the trench in such quantity as to thoroughly saturate the initial backfill without excessive pooling of water. After saturation, the conduit shall remain full until after final backfill is made. The wetted fill shall be allowed to dry until firm before final backfill has begun.

Water packing of the conduit beneath a terrace is required unless the terrace system is installed the following season.

### **FINAL BACKFILL**

Final backfill is backfill placed in the trench above the initial backfill. Final backfill material shall be free of large rocks, frozen clods, and other debris greater than three (3) inches in diameter. The material shall be placed and spread in approximately uniform layers in such a manner that there will be no unfilled spaces in the backfill and the backfill will be level with the natural ground or at the design grade required to provide the minimum depth of cover after settlement has taken place. Rolling equipment shall not be used to consolidate the final backfill until the specified minimum depth of cover has been placed.

Plastic conduits installed by the plow-in method require surface compaction and shaping in addition to the normal plow-on operations.

All special backfilling requirements of the conduit manufacturer shall be met.

#### **OTHER CONSTRUCTION OPERATIONS**

Additional requirements for the installation of clay and concrete conduits and for the installation of blind inlets and filters shall be as specified or according to the USDA-NRCS National Engineering Handbook Part 650, Engineering Field Handbook, Chapter 14.

Unless otherwise specified, work areas shall be restored to their former condition. Installation and backfilling shall be done in a workmanlike manner. Provisions shall be made for stabilizing disturbed areas and controlling erosion, as necessary. If specified, vegetation or other protective cover shall be established according to the appropriate NRCS Conservation Practice Standard.

#### **CERTIFICATION AND GUARANTEE**

The installing contractor shall certify to the landowner/operator that the materials and installation comply with the requirements of these specifications. The contractor shall furnish the landowner/operator a written guarantee against defective workmanship and materials to cover a period of not less than one (1) year. The contractor shall record on the guarantee the manufacturer's name and marking of the conduit material used.

The landowner/operator shall furnish the NRCS a copy of the contractor's certification and guarantee, which will be made a part of the supporting records of the underground outlet.

#### **ADDITIONAL CONSTRUCTION DETAILS**

Refer to the appropriate approved design plans for site specific additional items of work and construction details.